SERVICE CAMPAIGN BULLETIN

CAMPAIGN REF:	02C
TITLE :	Fuel Rail Procedure
DOCUMENT # :	11 K 002
AFFECTED VEHICLES :	12C Coupe and Spider

SITUATION :	McLaren Automotive Engineering have identified that a number of McLaren 12C's are fitted with fuel rails that are made from stainless steel s204 instead of stainless steel s304. Stainless steel s204 may corrode at an unacceptable rate due to the material's composition. Fuel rails made out of stainless steel s304 will last for the full life cycle of the vehicle.
PROCEDURE :	It is necessary to inspect all affected vehicles within your Aftersales car parc as listed in the appendix sheet of this document, both when carrying out Pre-Delivery Inspections (PDI) and at the next service centre visit.

Care Point: Ensure you are wearing appropriate gloves and eye protection before proceeding with this test below as the chemical used is sulphuric acid 1M.

Care Point: Ensure the working environment, test equipment and technician hands are absolutely clean and free of contaminants before commencing the test.

Care Point: Always ensure you are using the correct chemical and check expiry date defined on the bottle. The bottle should be closed immediately after use.

FUEL RAIL MATERIAL TEST TOOL

This procedure details the use of a supplied material test tool to determine if the fitted fuel rail is made from the correct or incorrect material. The test tool kit contains two sample sections of fuel rail material; one bar made of OK material and marked as CORRECT (Yellow) and one of NOK material marked as NOT CORRECT (Pink) (1). It is intended that you use these samples to perform a "calibration test" to familiarise yourself with the test procedure and in particular with the results seen on the supplied filter paper.

- Before each test on a vehicle a trial test should be carried out on both the OK and NOK sample bars to confirm the test equipment operates correctly to give the correct results.
- You should be able to easily differentiate between a yellow (OK) or pink (NOK) dot.
- A second technician should always check and verify the result.
- If there is any doubt at all you should repeat the test. If the result is still inconclusive STOP and raise a technical request for further assistance.

Care Point: Ensure that the tester is locating over a section of the fuel rail that you are testing and not another point in the engine bay. The tool has been designed to seat over the rail profile and only make a connection when it is seated correctly, however care must be taken to visually confirm it is locating correctly.


NOT CORRECT (PINK)
1

FUEL RAIL MATERIAL TEST PROCEDURE

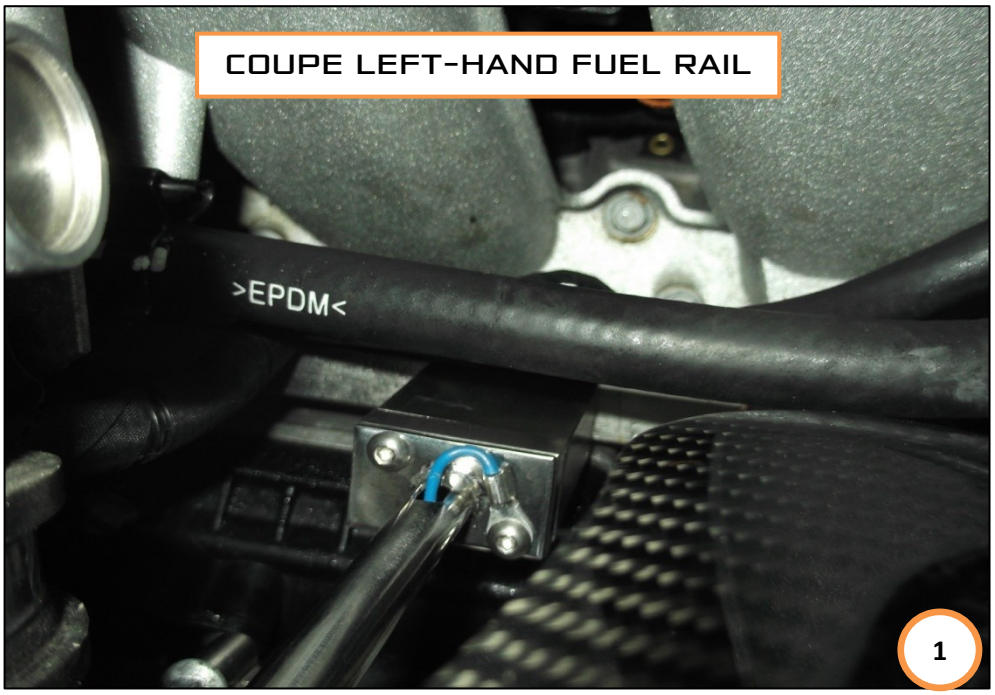
Care Point: A visual test of the fuel rail is not acceptable and may give a misleading result. The material test should always be performed.

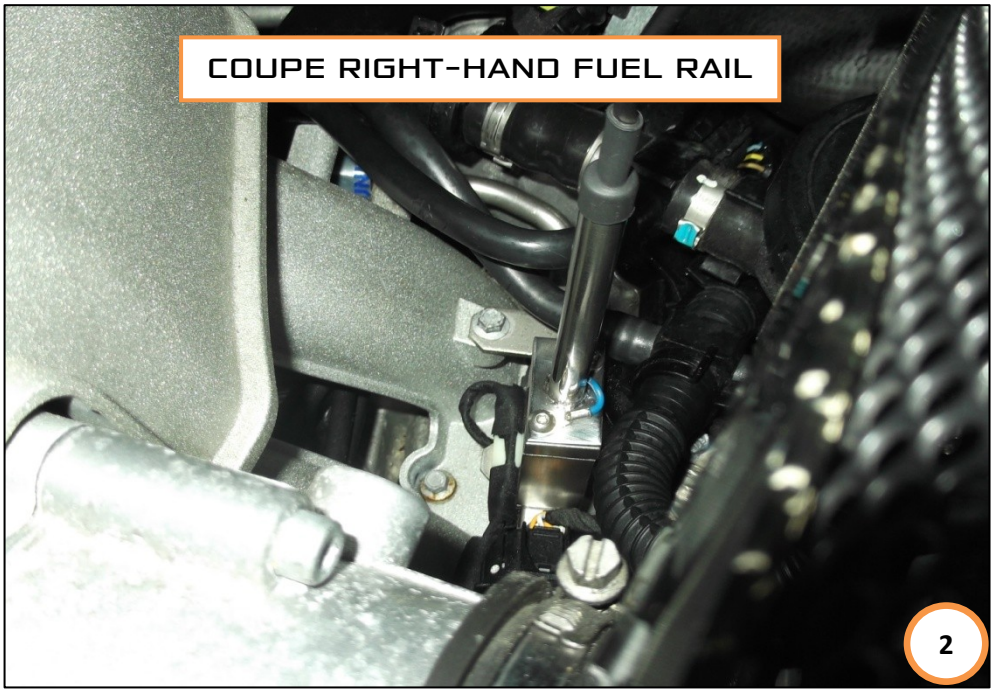
1. Fit vehicle protection kit.

2. Open the engine cover.

3. Partially remove the NVH pads on Spider variants from around the top of the engine in order to access the fuel rail.

4. With the use of a Scotchbrite pad (included in the kit) and brake cleaner, clean the fuel rail area where the tool will be placed to ensure that the surface is smooth and clean for testing. Please note that failure to clean the test area will lead to unclear test results. Location areas for the tool positioning are below (1 - 4).

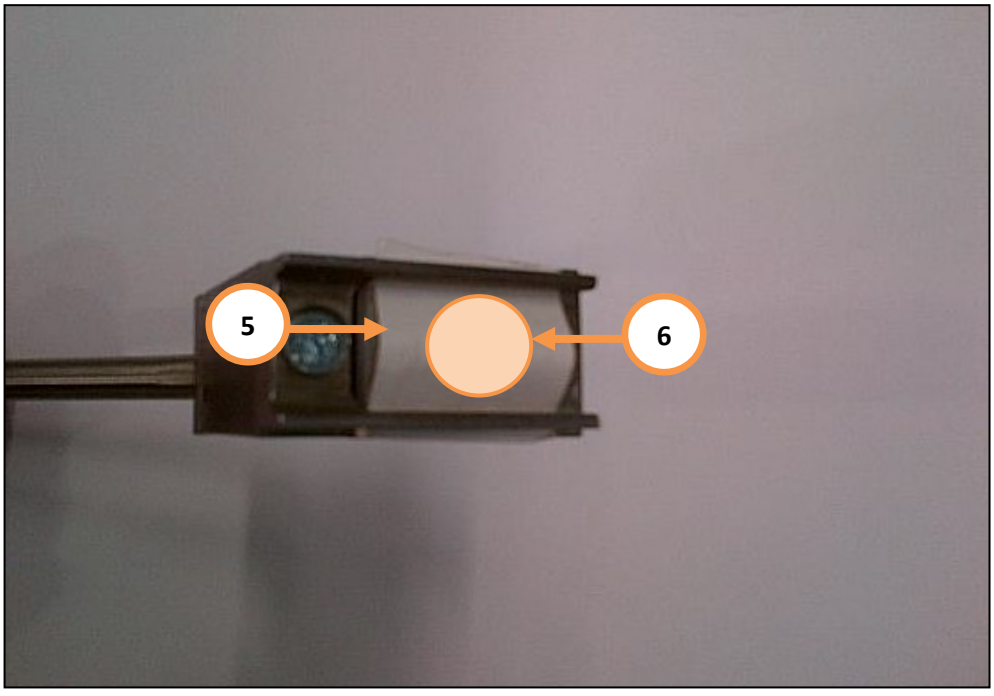



COUPE RIGHT-HAND FUEL RAIL
2


SPIDER LEFT-HAND FUEL RAIL
3

5. Cut off a length of two centimetres from filter paper roll supplied with the kit. Insert the paper into the tool (5) ensuring the paper is held between the electrical contact tip and the tool legs as shown below.

6. Apply 3 drops of chemical specified in this bulletin to the area shown below (6) using the pipette supplied in the kit. Ensure that the paper is thoroughly saturated at the point of the electrical contact.



7. Switch the tool on and ensure that the green light is illuminated (7). If the red light also comes on, the battery must be replaced before carrying out any tests as there is insufficient charge in the battery to perform the test.

Care Point: The tool should stay in contact with the fuel rail for no more than 3 seconds while testing. Any longer than 3 seconds and the chemical will react with the paper and turn brown giving an unclear result. If the yellow light does not illuminate then good contact has not been achieved; re-clean the surface you are testing to make sure it is clean.

8. Place the tool onto the fuel rail and push downwards to make sure that there is good contact. The electrical contact is spring loaded to assist in getting a good connection. The yellow light will come on indicating that a contact has been made (8). The yellow light may go out after a few seconds on its own as the chemical is used up but if the light does not go out on its own the tool should be removed after 3 seconds anyway.

9. Remove the tool and check the colour of the ‘dot’ on the paper.

Care Point: After a while the colour of the ‘dot’ will change so ensure that the paper is checked as soon as the tool is removed from the fuel rail.

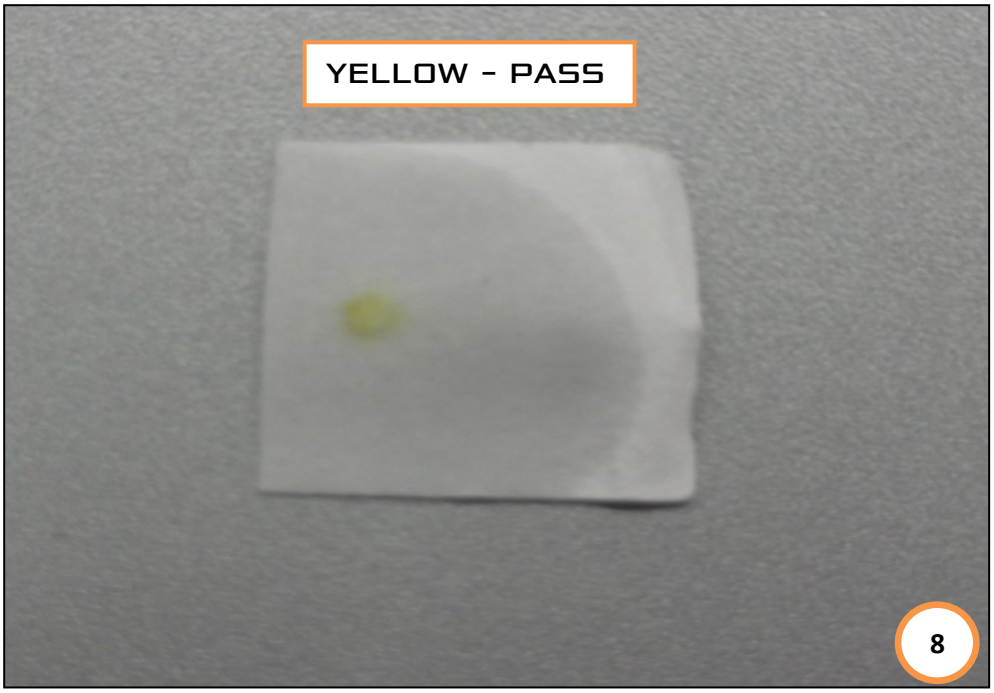
Care Point: If you have any doubt about the colour of the ‘dot’ please repeat the test.

Care Point: The fuel rail on each bank must be tested if the result of the first test is a PASS.

Care Point: If the paper shows signs of oil, coolant or other contamination this suggests that the fuel rail was not cleaned correctly and the cleaning procedure and test should be repeated.

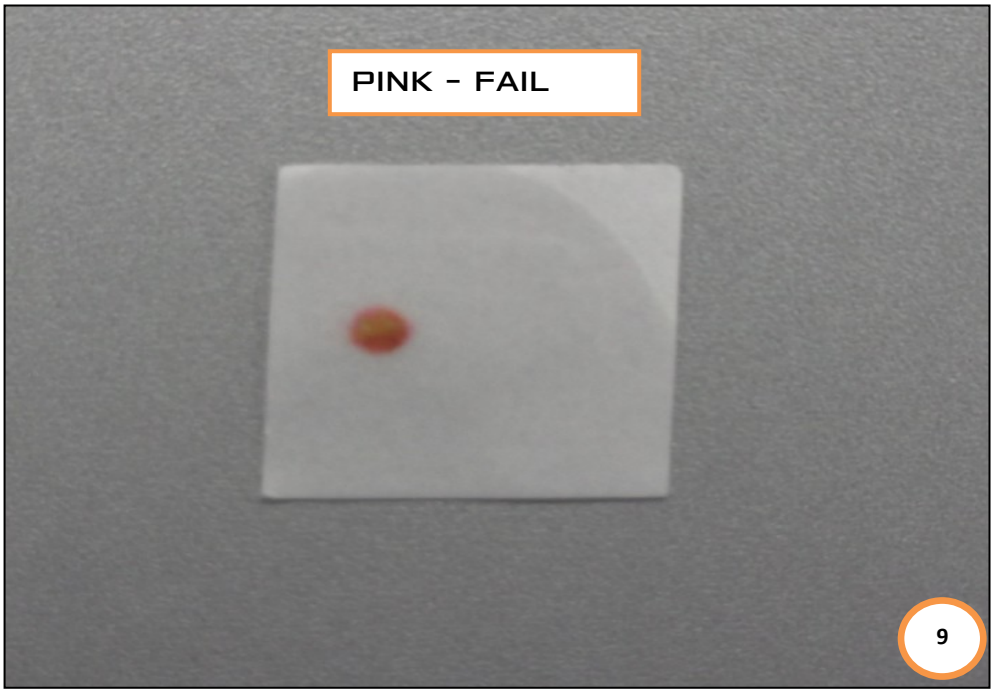
Care Point: If there is no ‘dot’ detectable check battery, replace filter paper and use calibration rail for retest. After confirming that the device is working properly repeat the test on the rail including cleaning. If there is still no clear result contact technical assistance

10. If the ‘dot’ is YELLOW the result is PASS and therefore the other side of the fuel rail must be checked. If both sides pass, no further action is required (8).



Care Point: A PINK dot will slowly turn brown over the course of 1 minute as the acid reacts with the paper.

11. If the ‘dot’ is PINK the result is FAIL and therefore the fuel rail has to be replaced. Proceed to the Fuel rail replacement procedure (9).



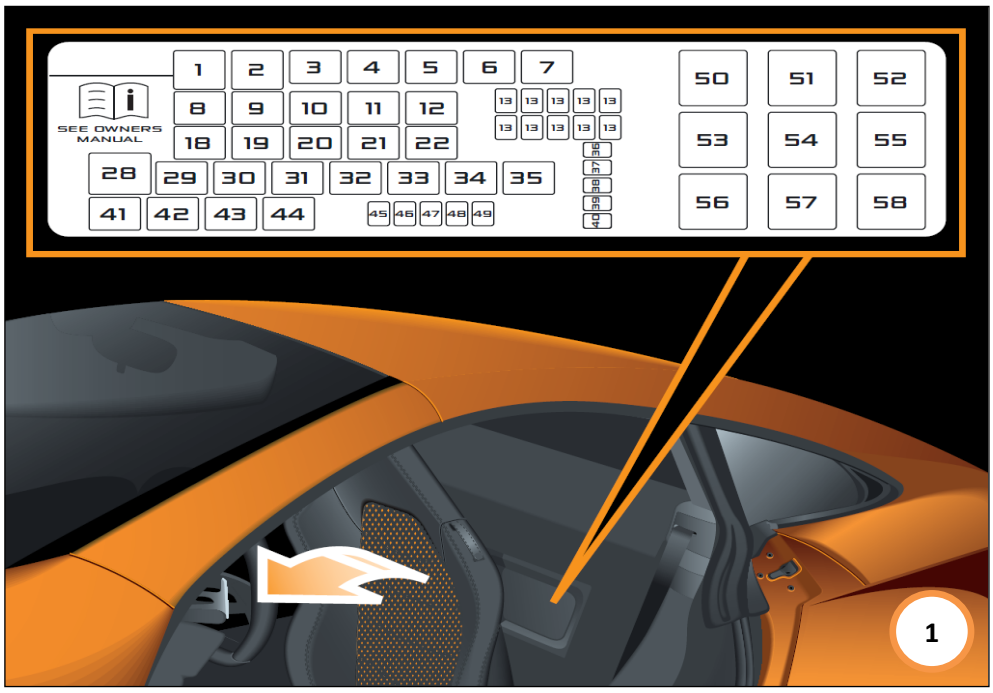
FUEL RAIL REPLACEMENT PROCEDURE:

Care Point: Fuels are highly flammable and toxic if inhaled. Fuel vapours are explosive, invisible and spread out at floor level. This vapour is poisonous when inhaled and has an anesthetising effect in high concentrations. Fuel can damage the skin; for example skin is degreased when it comes into contact with gasoline fuel.

o Keep fuel away from fire, open light or ignition sources.
o Ensure the work place is adequately ventilated.
o Never drain or pour fuels over assembly pits.
o Store drained fuel in a suitable and sealed vessel.
o Immediately eliminate any fuel that has flowed out.
o Never conduct this work on a vehicle near open flames (e.g. if wielding is being performed in the vicinity).

1. Connect the Mclaren Diagnostic System (MDS) to the vehicle and carryout a DTC read of all the modules and make a note of the DTC's logged in the Engine Control Module (ECM). End the MDS session.

2. Remove both fuel pump relays R50 and R52 from the main fusebox (1).



3. Start the vehicle and allow engine to idle and stall to depressurise the fuel system, repeat this two more times or until engine no longer starts.

4. Please refer to AA-RM-05M01-01-001 - Disconnect/connect battery ground line.

Steps 5 to 8 refer to Coupe and steps 9 to 13 refer to Spider.

5. Please refer to AA-RM-02A03-04-005 - Remove/install engine compartment side cover.

6. Please refer to AA-RM-04F01-01-018 - Remove/install throttle body.

7. Please refer to AA-RM-04F01-01-037 - Remove/Install engine intake sound generator.

8. Please refer to AA-RM-04F01-01-042 - Remove/install intake sound generator (ISG) throttle.

9. Please refer to AB-RM-02A03-04-006 - Remove/Install engine access hatch.

10. Please refer to AB-RM-02A03-04-001 - Remove/install engine compartment cover.

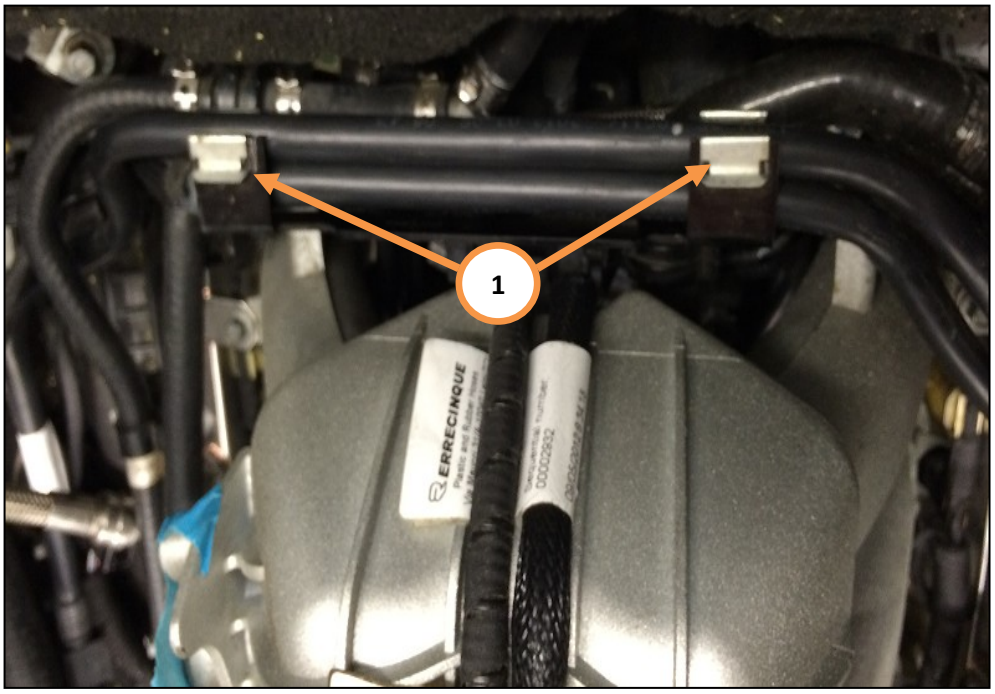
11. Please refer to AB-RM-04F01-01-018 - Remove/install throttle body.

12. Please refer to AB-RM-04F01-01-042 - Remove/install intake sound generator (ISG) throttle.

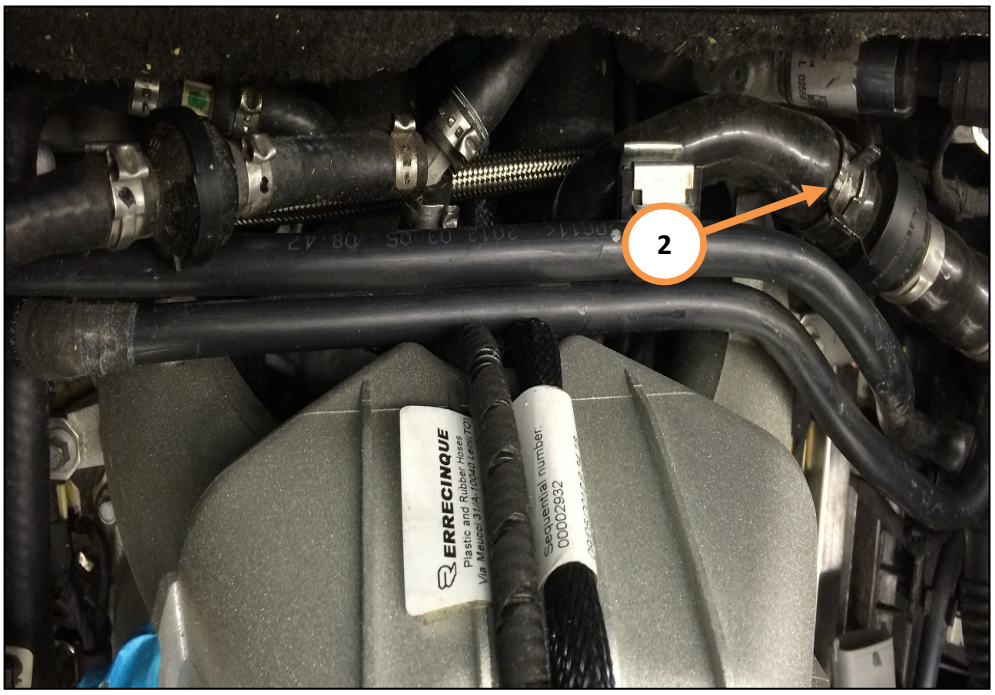
13. Please refer to AB-RM-04F01-01-045 – Remove/Install Injector noise, vibration and harshness (NVH) Pads.

Remaining procedures listed below refer to both model variants.

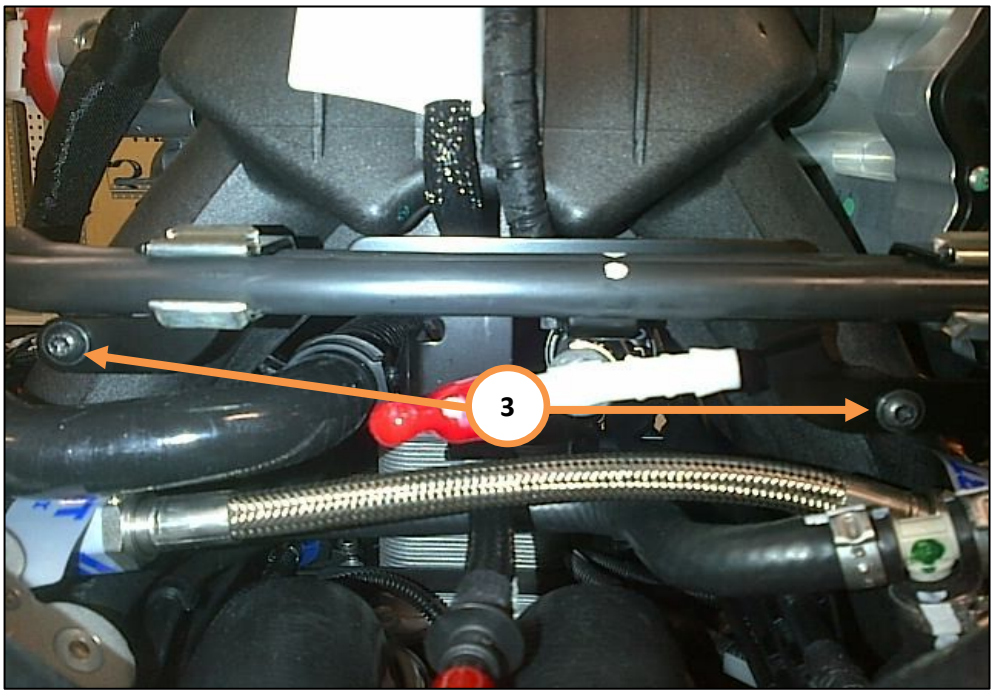
14. Unclip the vacuum pipes (1).

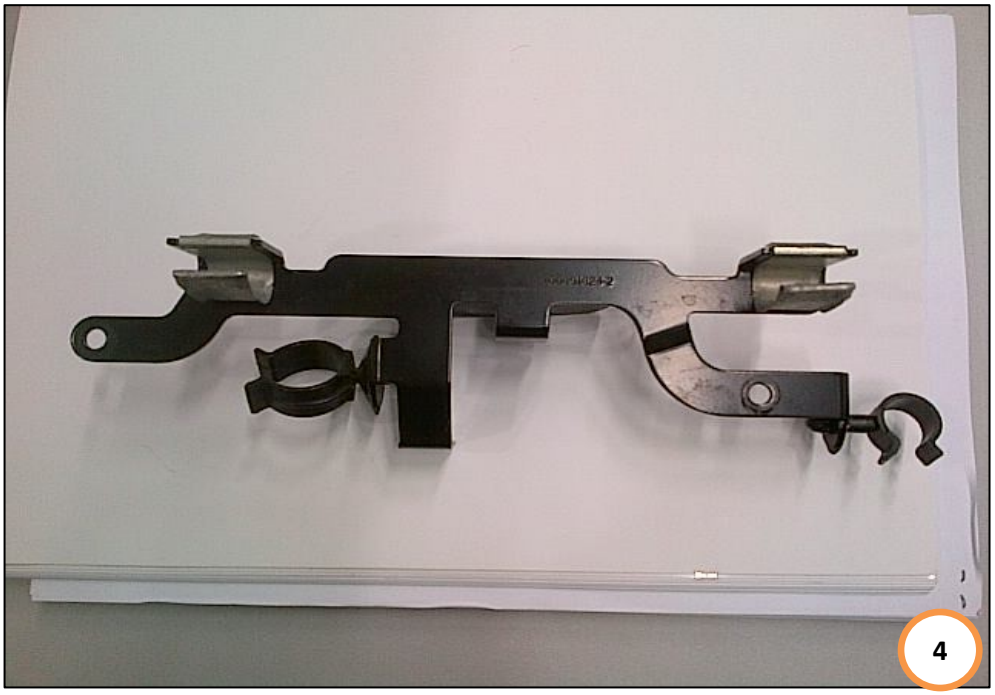


15. Disconnect the engine breather pipe (2).

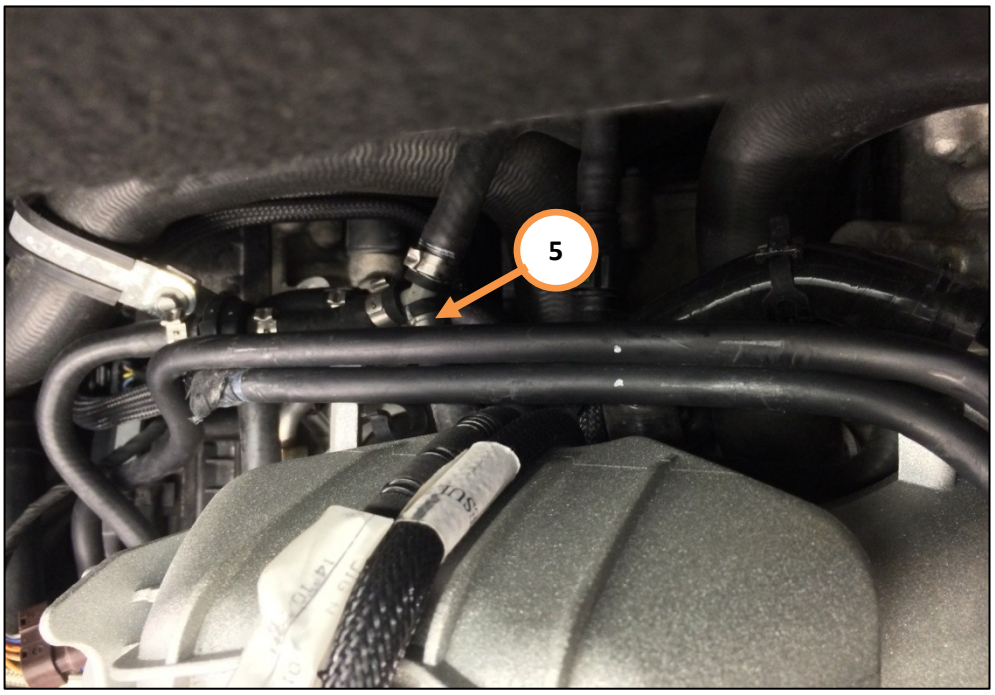


16. Remove both Torx 25 screws and the bracket from the inlet manifold that you disconnected the vacuum pipes from at step 14 (3 and 4).





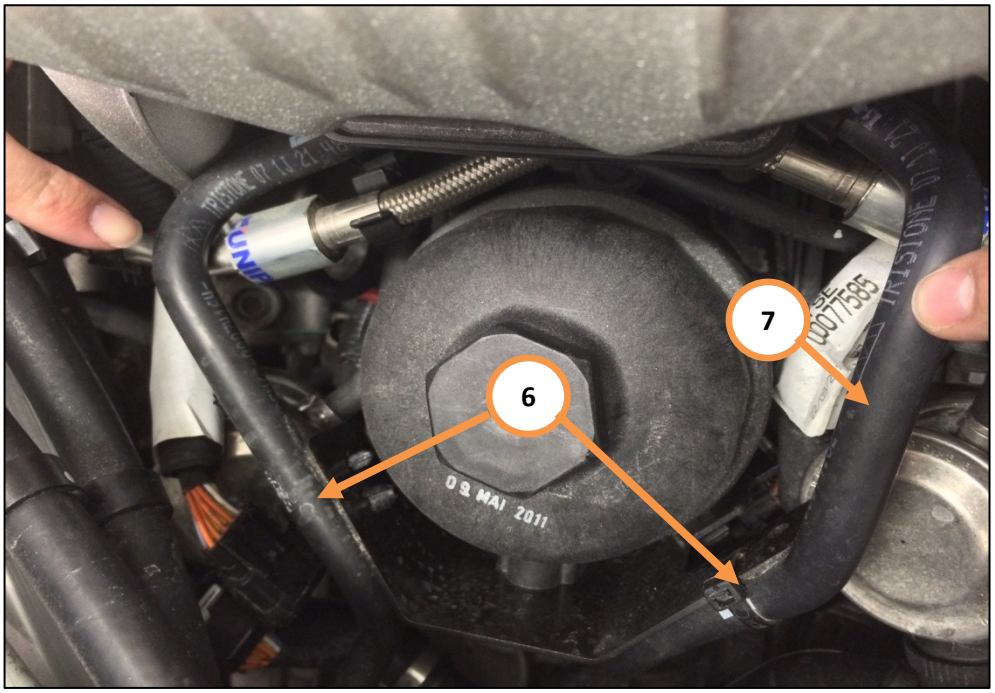
17. Remove the Oetiker clip on the vacuum pipe (5) and disconnect the pipe engine side.

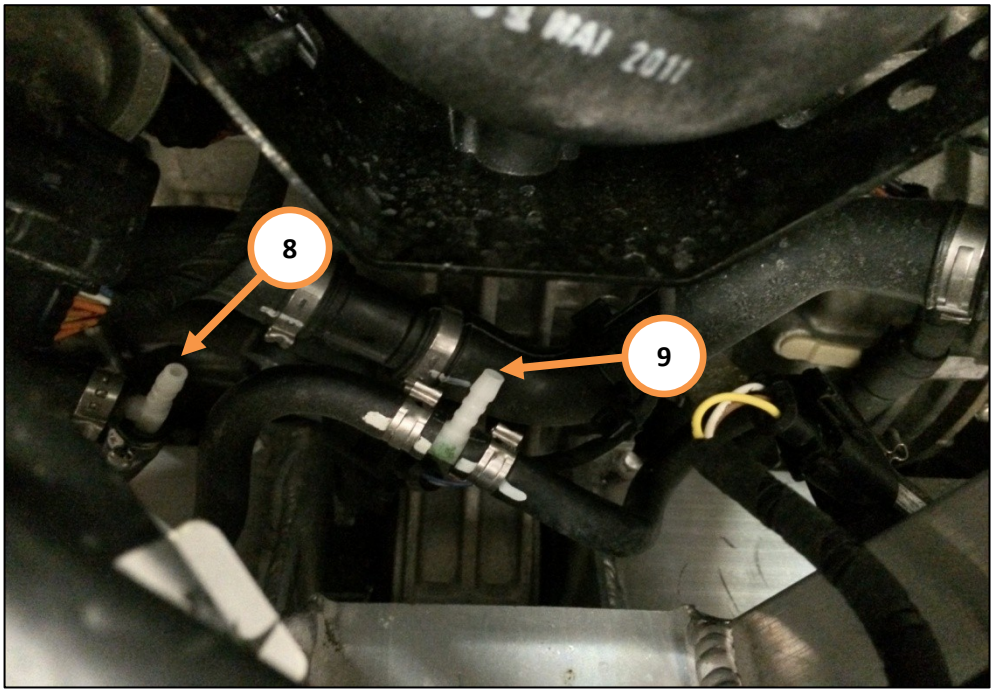


Care Point: Vacuum pipe (7) may be connected directly onto the vacuum pressure sensor and not onto a white T-piece. Sensor is located on the rear frame.

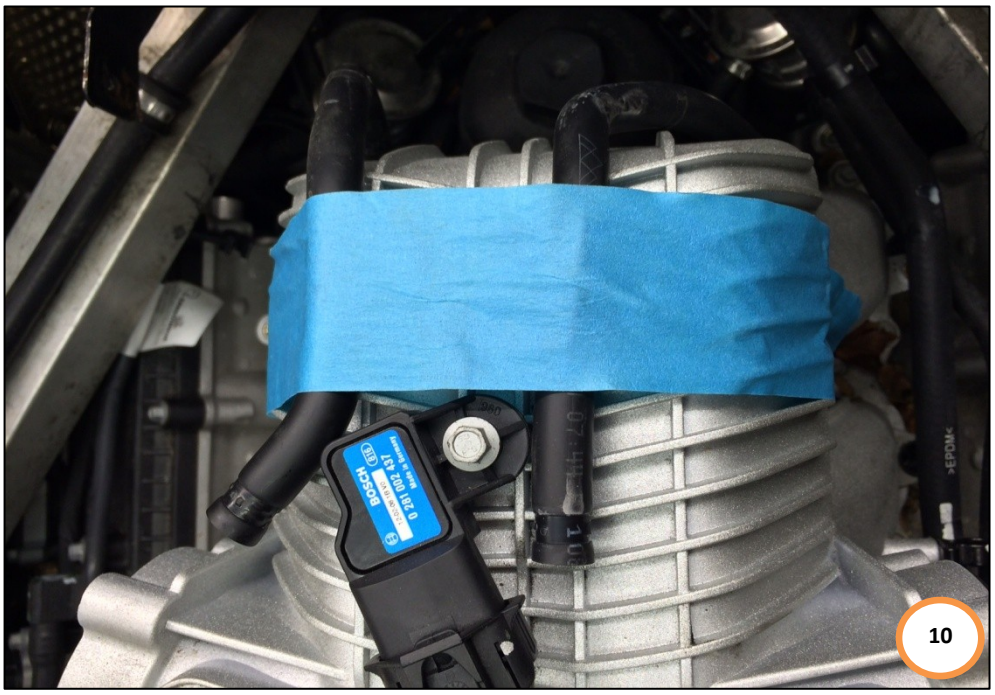
Care Point: The vacuum pipes can be removed by pulling them slowly if you are not able to get onto the Oetiker clip.

18. Remove the Oetiker clip on each vacuum hose (6), at the white T-piece connection which are located near the rear frame (8 and 9). Remove the cable tie securing each pipe to the bracket.

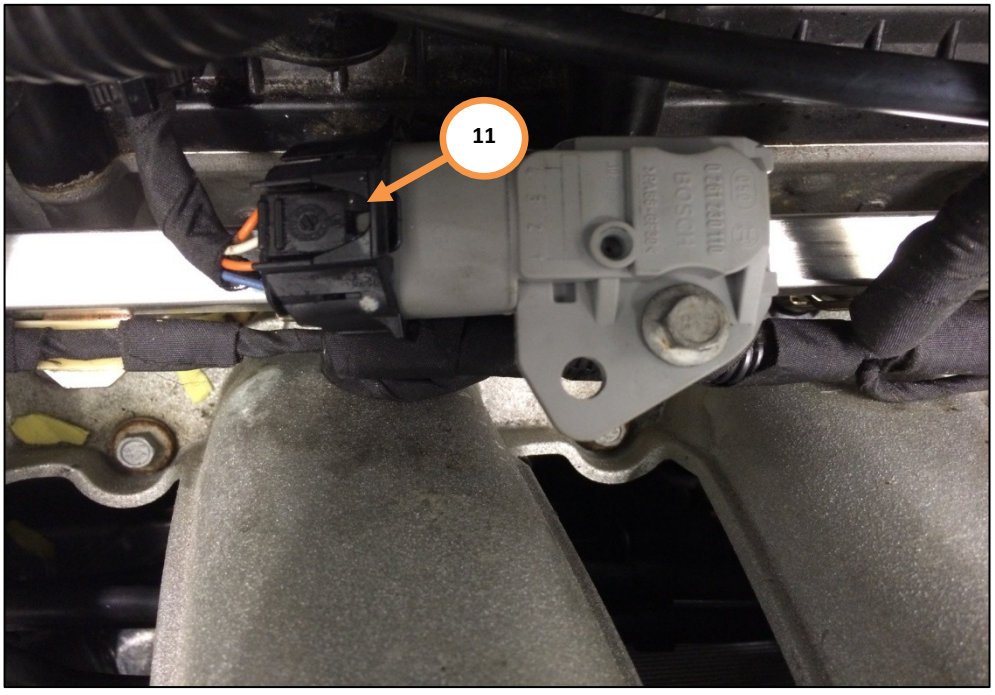




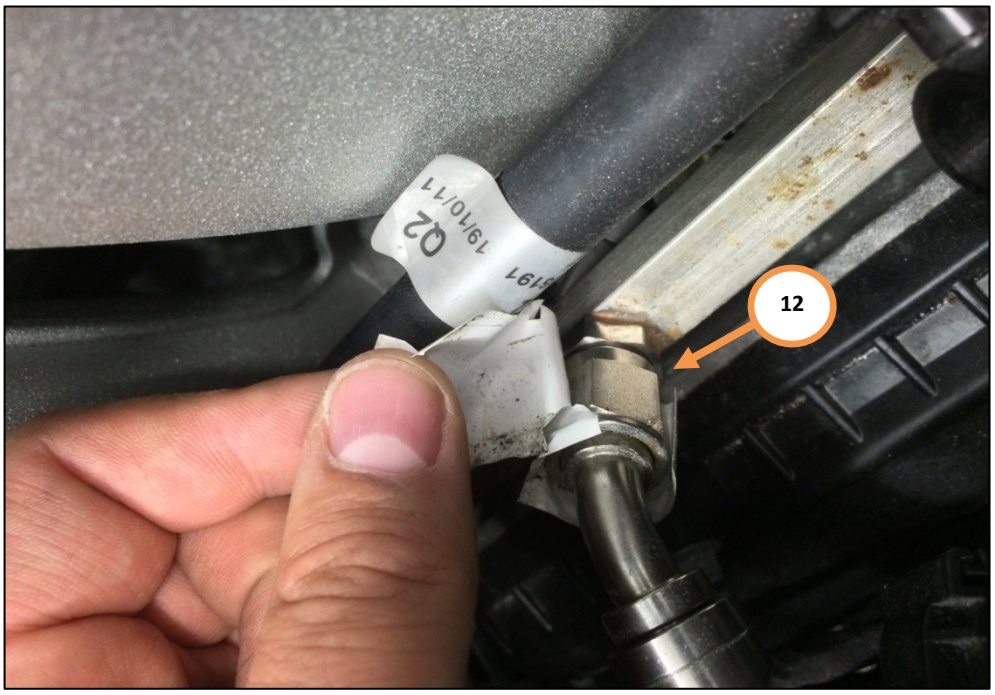
19. Tape the disconnected vacuum pipes to the inlet manifold (10).



20. Disconnect the fuel pressure sensor connector (11).



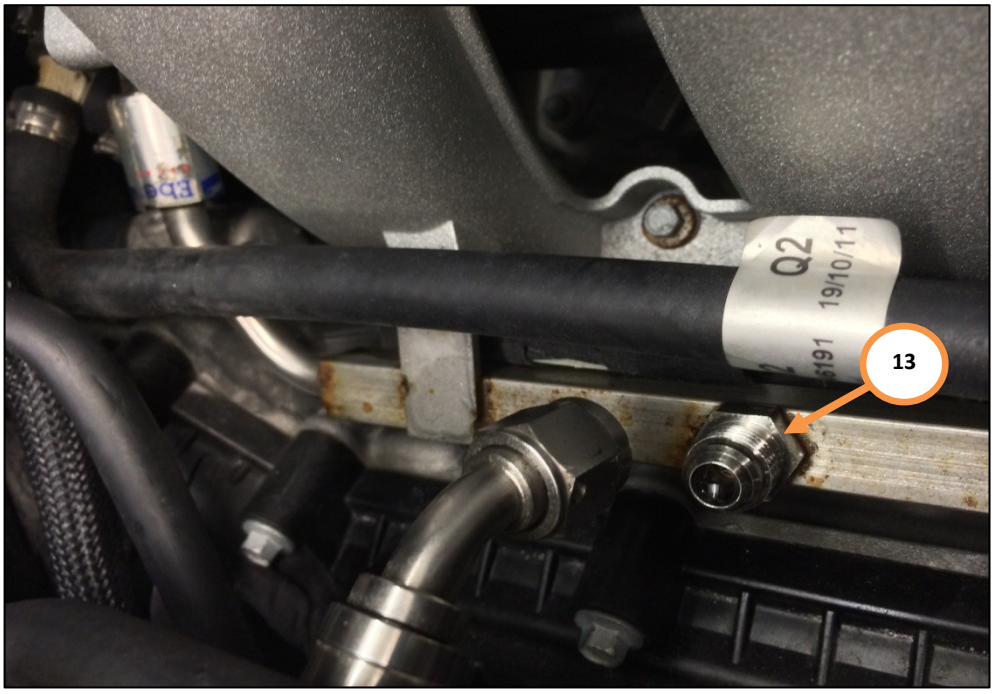
21. Remove the anti-tamper sticker on the fuel pipe union (12).

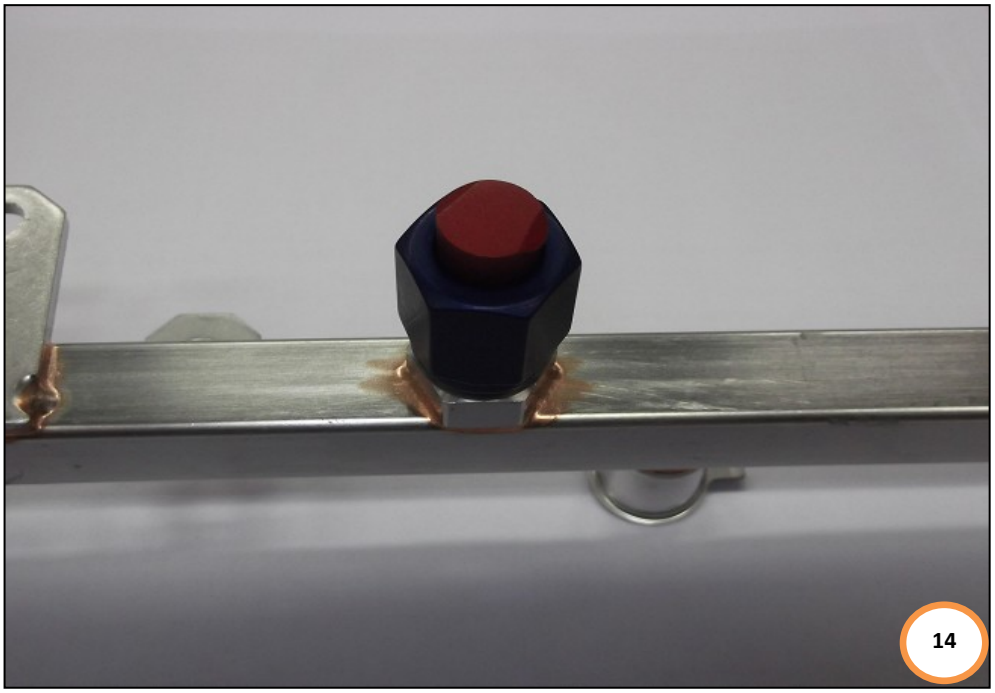


Care Point: Blanking plug is multiple use, so must not be discarded.

Care Point: Ensure any excess fuel is removed.

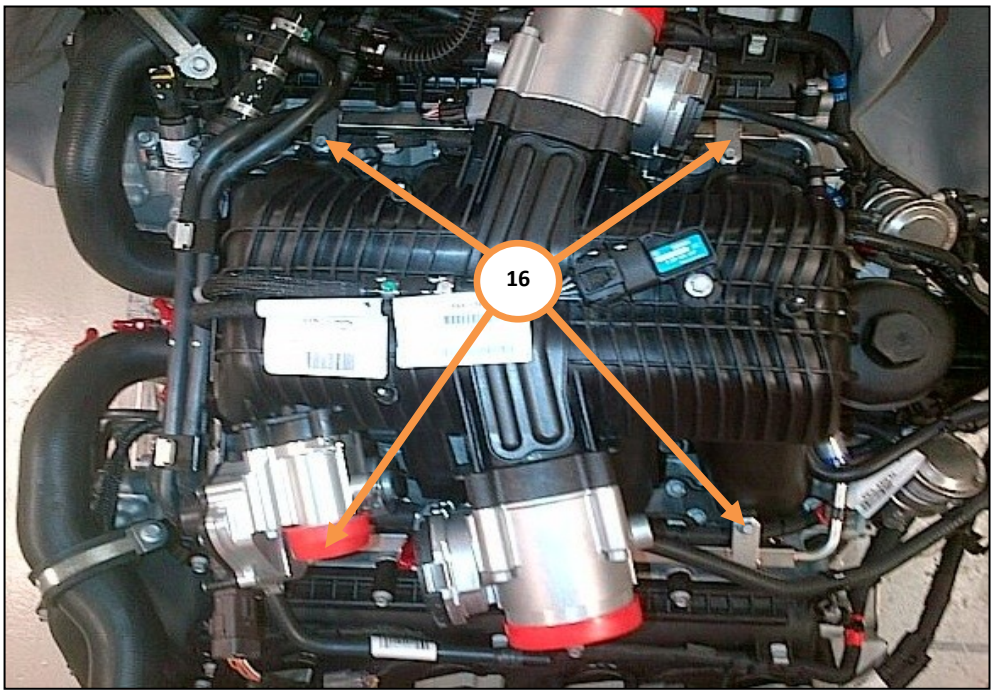
22. Detach engine bay fuel feed line union 18mm and install the blanking plug hand tight onto fuel rail (13 and 14)





23. Disconnect both fuel injector harness connectors IENEI1 and IENEI2 (15).

24. Remove the four fuel rail securing bolts (16).

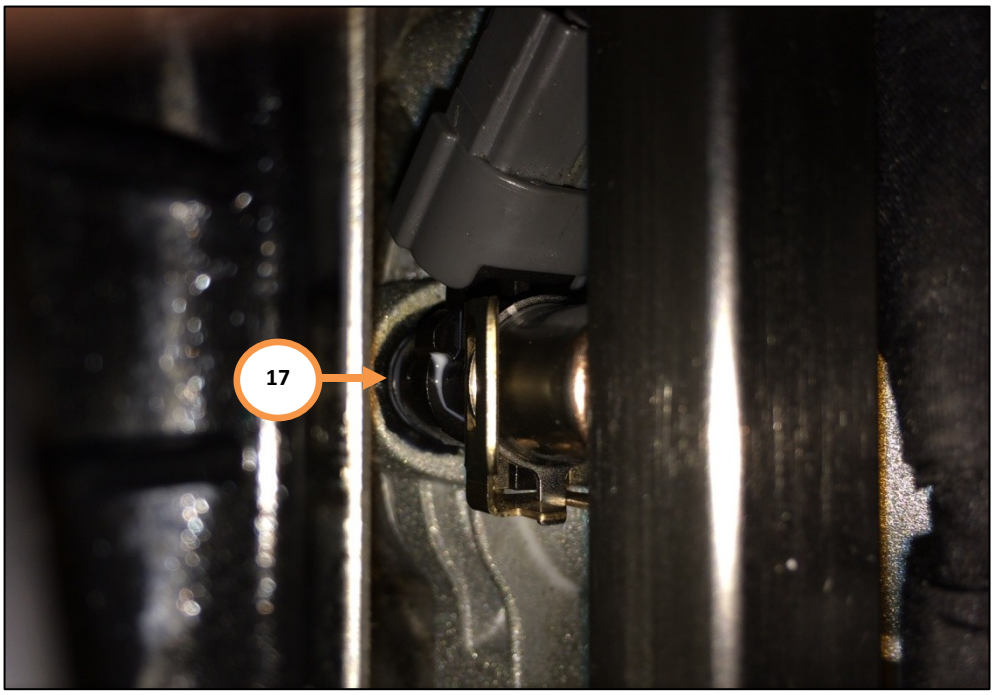


Care Point: The fuel rail will still contain some fuel; ensure any spilt fuel is removed.

Care Point: If the fuel injectors do not release from the inlet manifold carryout steps 26 to 27.

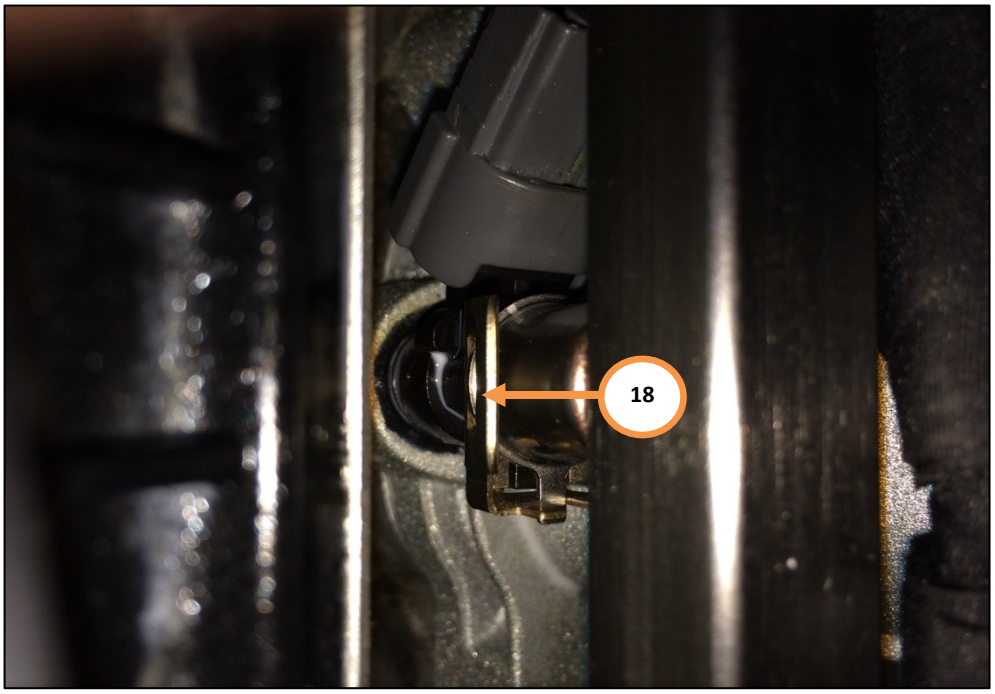
Care Point: Rotate rear of fuel rail upwards first and then remove it from the front carefully.

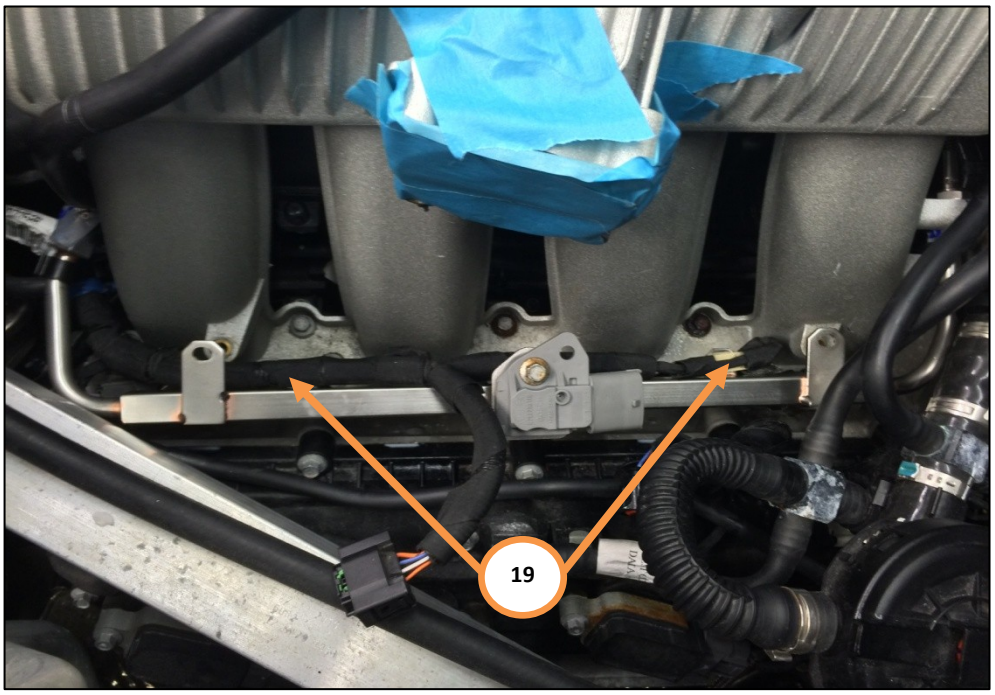
25. Apply some P80 THIX to the base of each fuel injector (17), allow a thirty second soak time and proceed to remove the fuel rail and injectors from inlet manifold. Proceed to step 28.



Care point: To prevent fuel injector clip being dislodged under the inlet manifold cover with a cloth.

26. Disconnect the relevant fuel injector clip with a screwdriver (18) and both fuel injector harness securing clips with a clip removal tool from the fuel rail (19). Proceed with the fuel rail removal.





Care Point: The injector must be removed by hand and not using any tools. If any tools are used the relevant injector must be replaced.

27. Remove the stuck fuel injector from the inlet manifold by rotating left to right and pulling at the same time, once they have all been removed proceed below.

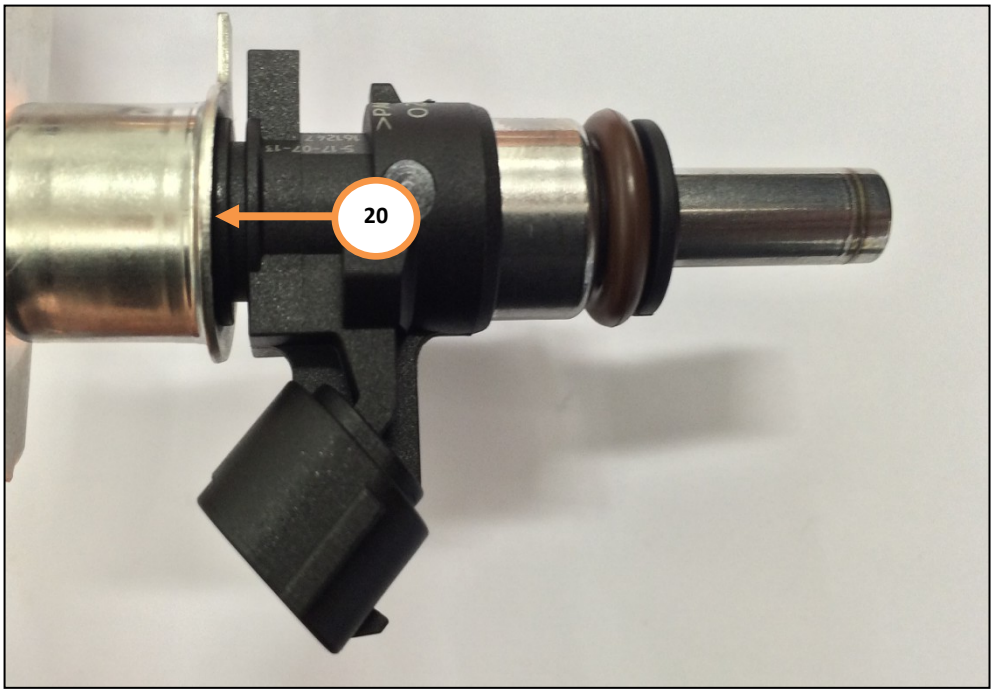
Care Point: Ensure you carefully unlatch the injector electrical connector.

Care Point: Take care when removing the injector that it is not dropped. If it is dropped it must be replaced.

Care Point: Use a fir tree removal tool to aid removal of the harness from the clipping points.

28. Remove the injector harness and remaining fuel injector clips from the removed fuel rail.

29. To aid removal of the fuel injectors from the fuel rail apply some P80 THIX to all the joints (20). Proceed and remove all the fuel injectors from the fuel rail.



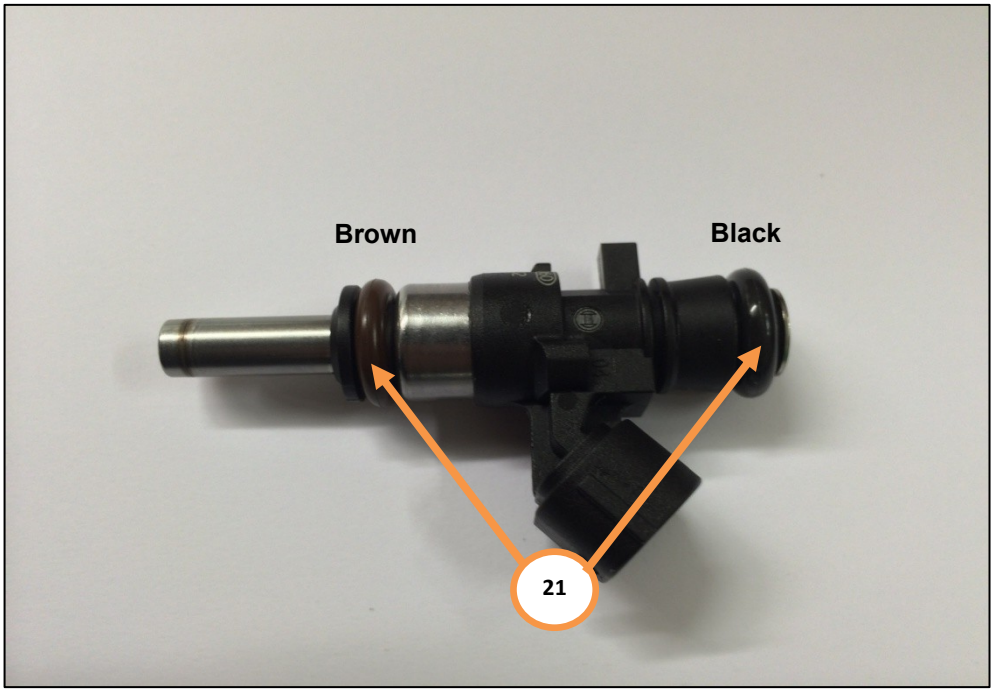
30. Remove the securing bolt from fuel pressure sensor. Apply P80 THIX onto the new fuel pressure sensor O-ring and install the sensor onto the new fuel rail and torque to 10 Nm.

Care Point: Take care to ensure that the injector body has not been damaged in any way by removing it from the old fuel rail.

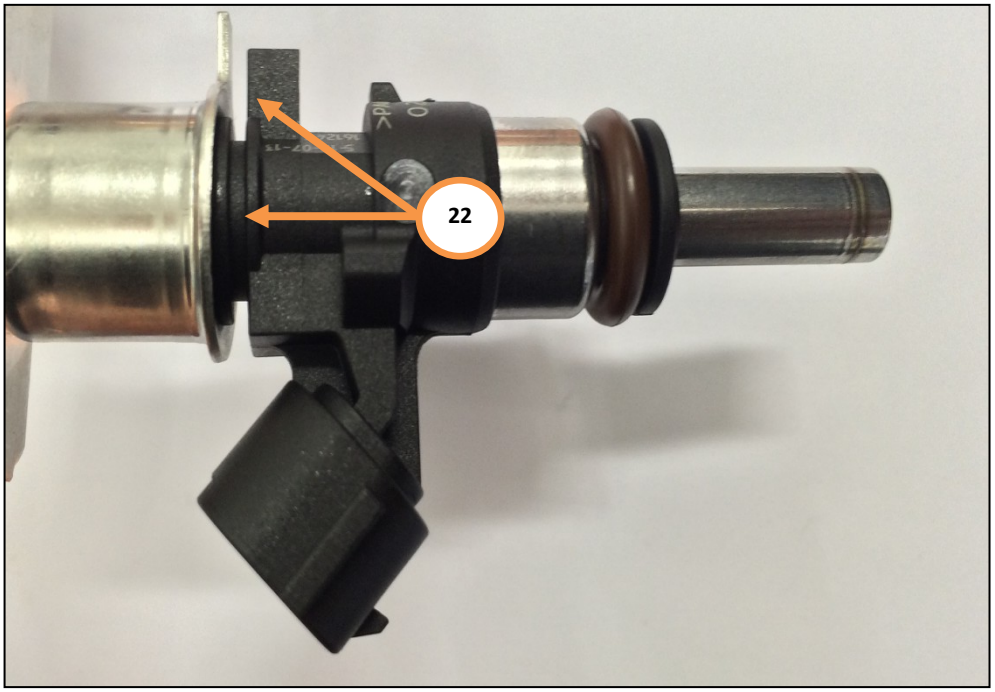
Care Point: Inspect the injector nozzle surface to ensure that it has not been damaged in any way.

Care Point: Inspect new fuel rail, cups and new injector O-rings to ensure that they are not damaged or contaminated in anyway.

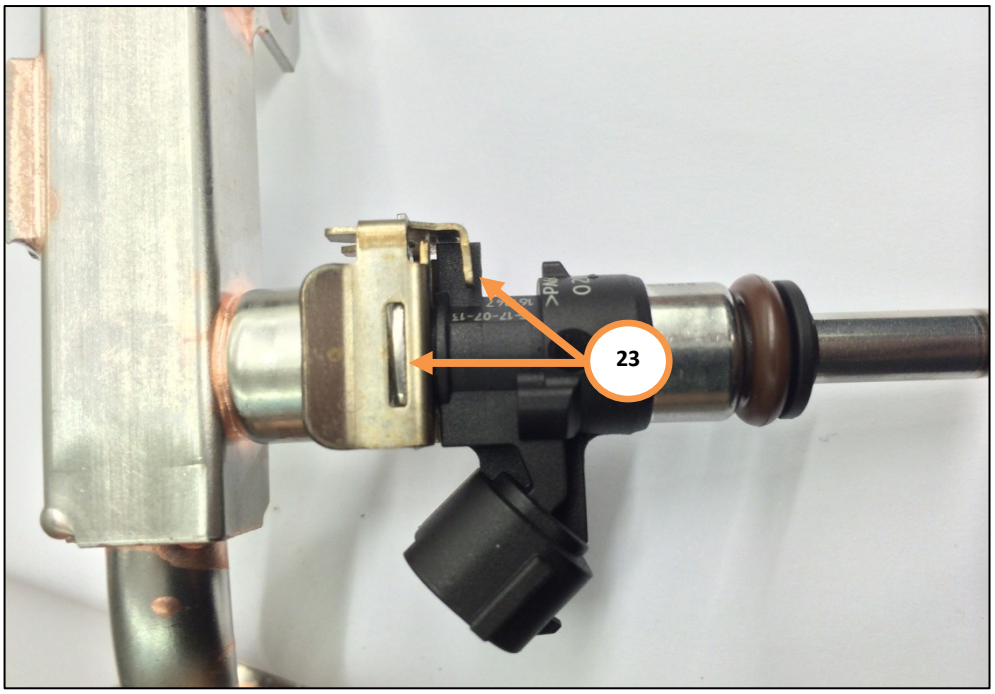
31. Remove existing injector O-rings from the injectors. Clean the O-ring grooves with brake cleaner and lubricate the new O rings with P80 THIX prior to installing them to the injectors. Black seal at the top and the brown seal at the bottom (21).

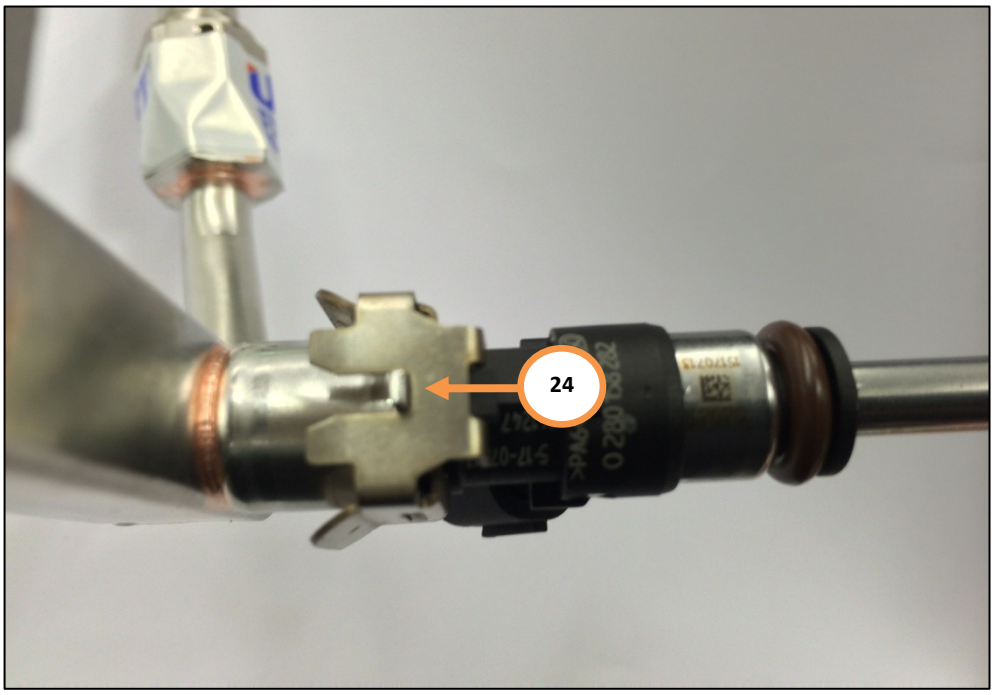


32. Install all the fuel injectors into fuel rail ensuring the black peg on the injector is aligned with the metal tag on the fuel rail to allow the securing clip fitment as shown below (22).

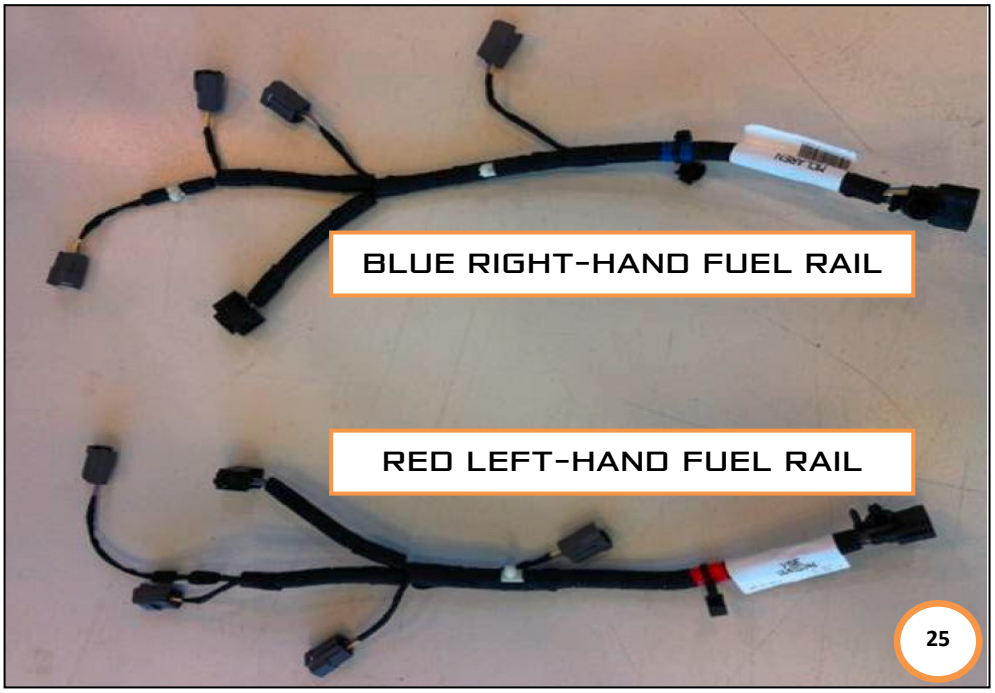


33. Install new fuel injector securing clips and ensure they are positioned as below (23 and 24).

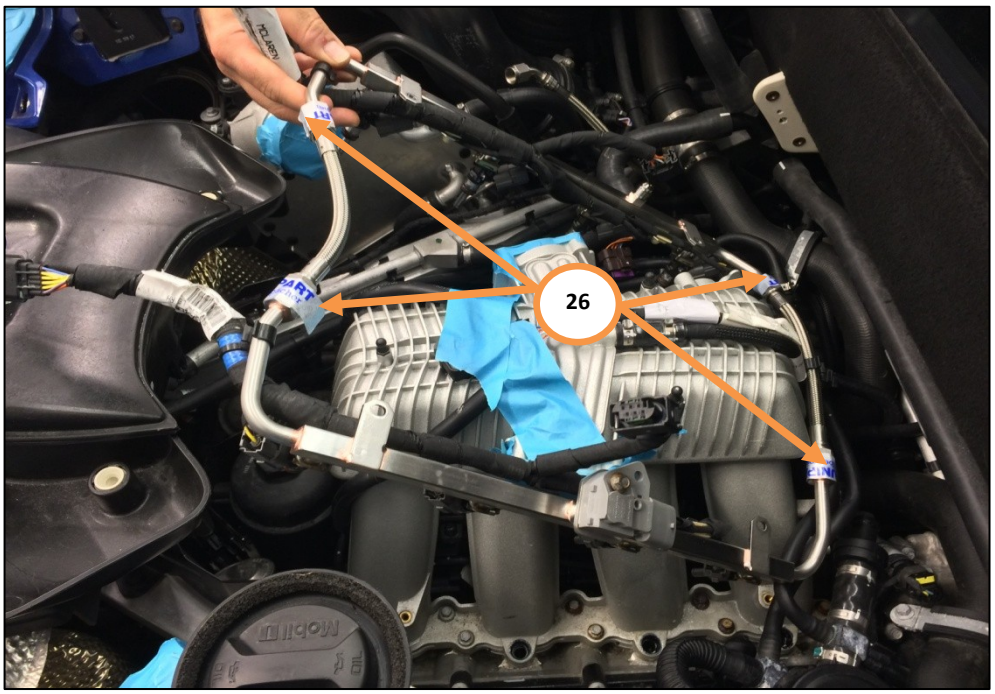




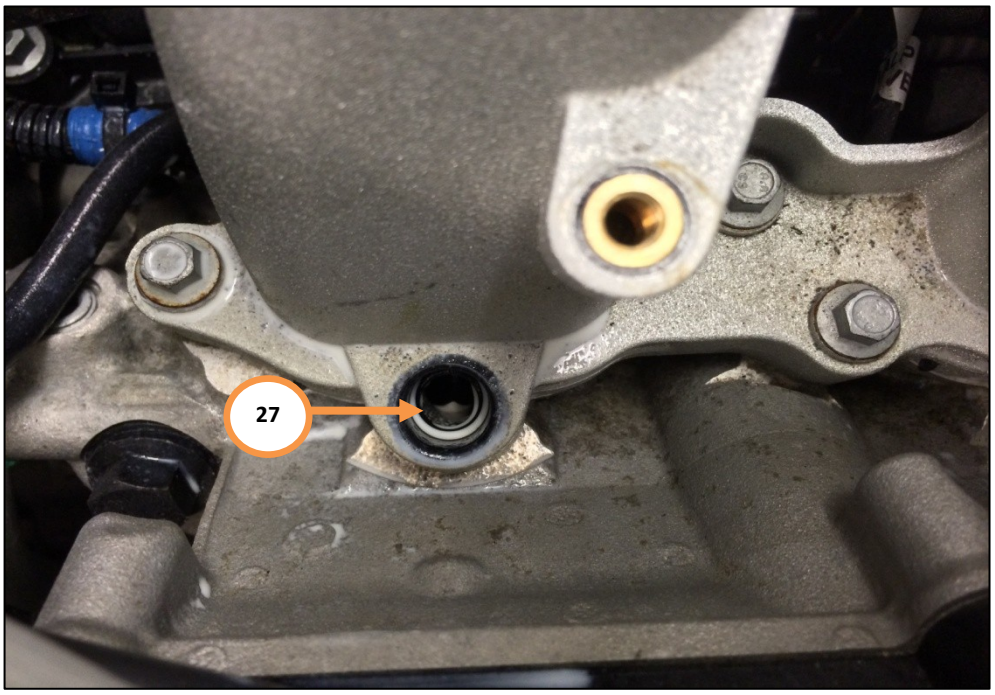
34. Transfer both injector harnesses, with blue tape identification located to the right hand fuel rail and the harness with the red tape identification onto left hand and connect to the injectors (25).



35. To prevent the existing fuel rail anti tamper stickers coming adrift during fitment of fuel rail, apply insulation tape (26).



36. Clean the injectors locating holes in the inlet manifold using brake cleaner and a lint free cloth (27).



Care Point: Two technicians will be required to guide the new fuel rail and injectors onto the inlet manifold.

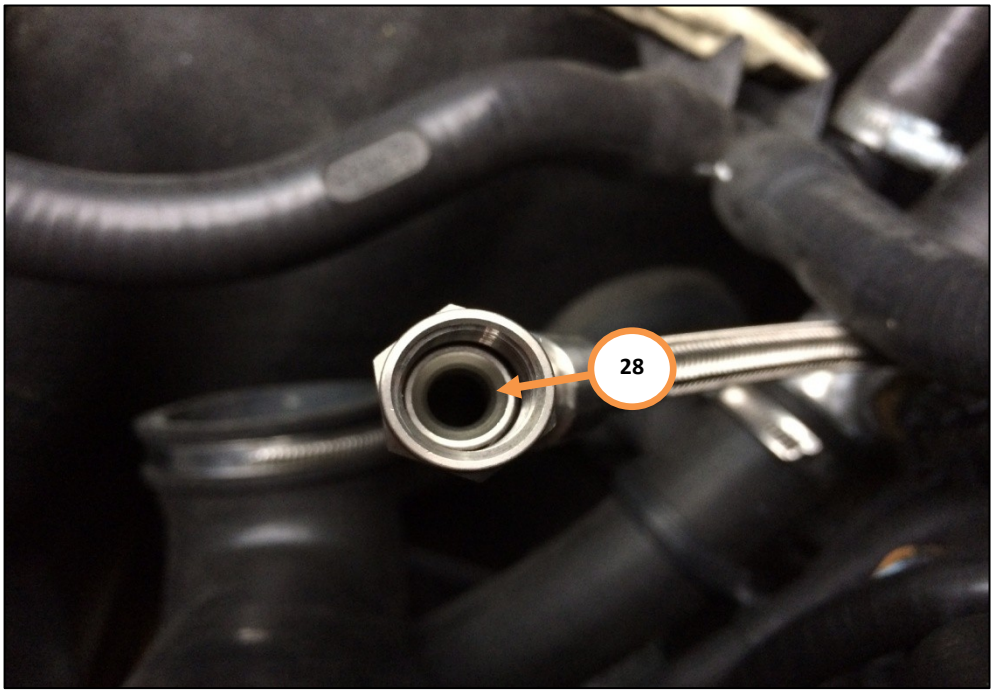
Care Point: Check that O-ring has not been trapped or pinched during fuel rail assembly.

37. Apply P80 THIX to the brown injector's seals.

38. Install the fuel rail and injectors onto the inlet manifold, carefully push downwards until you feel it has fully engaged. Torque the four securing bolts to 10 Nm.

39. Inspect fuel feed pipe for debris and scoring marks (28). If deep scoring marks are found raise a technical request for further assistance.

40. Remove the protective cap from the new fuel rail union joint and inspect the surface and thread for any damage. If scoring marks and/or thread damage is found raise a technical request for further assistance.



Care Point: Throttle bodies and ISG throttle must not be reinstalled at this point.

Care Point: Check fuel pressure sensor and injector electrical connectors for any damage.

41. Reconnect the engine bay fuel feed line union onto fuel rail and torque 25.5 Nm.

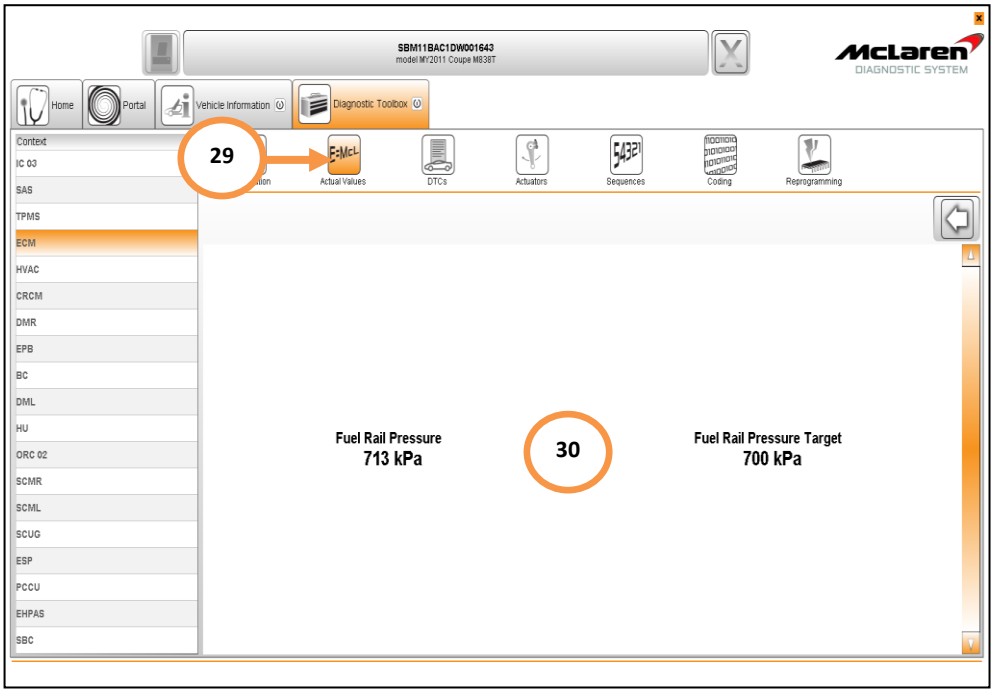
42. Reconnect the fuel pressure sensor and both fuel injector harnesses.

43. Reinstall both fuel pump relays R50 and R52.

44. Reconnect the battery ground line.

45. Connect the McLaren Diagnostic System (MDS) to the vehicle. Select ECM and delete the DTC's logged that relate to fuel pressure and fuel pump relays.

46. Then proceed to Actual Values (29), select the following values as per the screenshot below (30), then select the play button to access the required data screen.



Care Point: The fuel pump will operate periodically to maintain system fuel pressure above 700kPa.

47. Check the fuel pressure value is above 700 kPa and visually inspect the fuel rail and injectors for fuel leaks. If after two minutes no leaks are found and fuel pressure value is maintained above 700kPa, switch the ignition off and proceed below. If a fuel leak is found or the fuel pressure is not maintained above 700 kPa switch the ignition off and raise a technical request for further assistance.

48. The new anti-tamper fuel sticker must be installed by starting at the right most edge of the fuel delivery union, and continually wrap around the joint and stuck to itself so that the joint is covered (31).

INSTALLATION:

1. Install components in reverse order.

2. Switch ignition on and carryout a DTC read and delete of all the modules.

3. Start the engine and allow to idle and recheck for fuel leaks. If no leaks are found the repair is complete. If a fuel leak is found switch the ignition off and raise a technical request for further assistance.

Date released: 25/02/2014

Fuel Rail Kit Contents

Parts	Quantity
Fuel Rail	1
Fuel pressure sensor	1
Oetiker clip 14.8	1
Oetiker 13.3	2
Cable Tie	2
Anti-Tamper Fuel Sticker	1
Injector O-ring Lower Brown	8
Injector O-ring Upper Black	8

McLaren will auto issue one fuel rail test kit 11S4841CT and fuel rail replacement kits to each dealer based on your vehicle parc, further kits MUST be ordered by the dealer.

Warranty Information: If fuel rail replacement is required claim and additional 3.0 hours and the fuel rail replacement kit.

You MUST enter into the warranty claim if one or both of the fuel rails have failed the test and attach a picture of the removed fuel rail assembly. The warranty claim will be rejected if this is not completed.

Please contact your Regional Aftersales Manager should you have any questions relating to the information contained within this bulletin.

WARRANTY INFORMATION

DESCRIPTION	RESOLUTION CODE	TOTAL REPAIR TIME
Fuel rail test	E0F101G8A11P4K09	0.35 hours

PARTS INFORMATION

PART DESCRIPTION	PART NUMBER	QUANTITY	ORDER PROCESS
Fuel rail Kit	11F1593CP	1	Unipart
P80 THIX	N/A	As required	Locally sourced
Sulphuric acid 1M	N/A	As required	Locally sourced